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Total Cotinine in Plasma: A Stable Biomarker for Exposure to Tobacco Smoke

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Determination of plasma cotinine concentration is the predominant assay employed to quantify smoking and exposure to environmental tobacco smoke in epidemiological studies. However, cotinine is biotransformed into secondary metabolites. This pilot study determined plasma concentrations of cotinine, cotinine glucuronide, 3-hydroxycotinine, and 3-hydroxycotinine glucuronide. Total cotinine concentration was determined by summation of all four metabolites. The goals of this study were (1) to explore the stability and validity of total cotinine concentration as a measure of tobacco smoking and as a measure of exposure to environmental tobacco smoke in nonsmokers, (2) to explore the stability of plasma concentrations of each of the four nicotine metabolites in smokers by performing a.m. and p.m. measures, and (3) to explore the stability of indices of glucuronidation as measures of possible markers for enzymatic activity. The subject sample included 76 white volunteers (32% smokers and 68% nonsmokers). Plasma total cotinine concentration appeared to be very stable, suggesting that total cotinine concentration may be a good measure for epidemiological studies employing a single plasma sample. Moreover, plasma total cotinine concentration also reflected exposure to environmental tobacco smoke more accurately than did plasma cotinine concentration, which would have not identified 27% of passive smokers.

3-Hydroxycotinine glucuronide and 3-hydroxycotinine plasma concentrations were almost as stable as cotinine concentrations. However, cotinine glucuronide and its indices of glucuronidation were unstable, suggesting that cotinine glucuronide undergoes *in vivo* deconjugation. New studies of total cotinine in plasma using more than two blood collections during the day are needed to definitively establish that it is a stable biomarker for epidemiological studies.

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